Project Title:
Living With a Star: Global Modeling of Near and Distant Geomagnetic Field, Based on Magnetospheric and Interplanetary Data

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Project Information:
The goal of this project is to develop a practical and realistic quantitative model of the geomagnetic field, valid in the entire geospace from low altitudes to the magnetospheric boundary and the distant magnetotail. The model will be based on the largest set of magnetospheric and solar wind data ever used, provided by many past and present space missions, and covering a wide range of interplanetary conditions, observed over more than two solar cycles. This effort is supposed to bridge the gap between the models of Earth's internal (IGRF) and external magnetic field. The model will replicate the observed variability of the magnetospheric configuration in response to varying solar wind conditions. Among its practical uses will be a short-term prediction of the penetration and cut-offs of the solar energetic particles, affecting low-altitude space technologies and the safety of manned missions. The proposed research will also benefit the development of future LWS missions, aimed at assimilating simultaneous data from constellations of spacecraft. Combining such data with flexible models by means of fast-fitting algorithms would make it possible to dynamically reconstruct varying magnetospheric configurations and provide instantaneous "snapshots" of the global magnetosphere.

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Citations: